

Further catastrophic reduction of sea ice caused by activations of sea ice motion and upper ocean circulation in the Arctic Ocean

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The summer minimum sea ice extent in 2008 was resulted in the second minimum record after the passive microwave observation since 1979. The sea ice extent is slightly smaller than that in 2007. Does this mean that the Arctic sea ice begins to recover? This would not be true. We should pay attention to the sustained retreat pattern of sea ice and the changes in underlying ocean. In the Pacific sector, the sea ice motion was substantially accelerated in 2007/2008 winter due to fragmented sea ice near the coast of Canadian Archipelago in the eastern Canada Basin. Why was the fragmentation of sea ice occurred there at that timing? We assume that sustained thinning of sea ice due to less sea ice formation associated with the ocean warming is important. From our sustained observation in the Canada Basin by R/V Mirai and Canadian ice breakers, we have detected the recent anomalous changes in the upper ocean.

(1) Huge amount of Pacific Water was delivered onto the Northwind Ridge and Chukchi Plateau area associated with strengthening of upper ocean circulation.

(2) Upward heat flux from Pacific Summer Water layer was increased due to deepening of surface mixed layer.

From these observational evidences suggests that the Pacific sector of the Arctic Ocean is now changing from an ocean covered by multiyear ice into an ocean with seasonal ice cover.